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(54) **Measuring or treatment instrument with laser sighting**

(57) A laser sighting device, for use in conjunction with measuring and treatment instruments, such as pyrometers, has means for generating at least one primary laser beam (112), of relatively greater intensity, to be directed at a target surface (111) so as to illuminate a small area thereof, for example a central spot (112A) of the area. The device has means (107, 113) for, from time to time, sub-dividing the at least one laser beam into a greater number of secondary beams (114) of lesser intensity directed towards the target area for the purpose of creating on the target surface at least a number of spots (114A) some of which are spaced outwardly of the central area, to define a zone for investigation with the instrument. The secondary beams (114) are of lesser intensity than the primary beam (112) and vary in number, and the arrangement is such that the means (107, 113) for sub-dividing the primary beam operate at timed intervals so that the target area is illuminated alternately at the central spot, and thereafter by the secondary beam spots (114A), for defining the zone under investigation. The secondary beam spots serve to define one or more patterns, such as a closed loop (Fig. 2), on the target area. The secondary beams may include a central spot beam (112). As the result of sub-dividing of the primary beam is to lessen the intensity of the spots formed by the secondary beams, the primary beam serves to give the user of the instrument a clear visual indication of a point of the target area, for aiming purposes, whereafter the spots of the secondary beams serve to indicate to the user the specific area of the tar-

get which is under investigation.

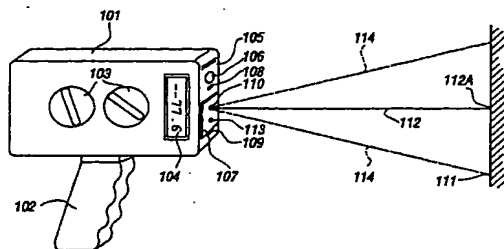


FIG. 1

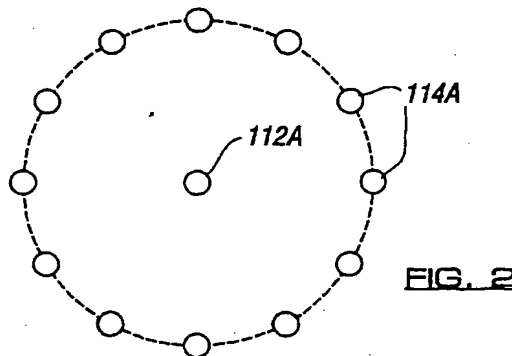


FIG. 2

Description**BACKGROUND OF THE INVENTION****FIELD OF THE INVENTION**

[0001] The invention relates to the field of hand-held measuring instruments such as for example instruments for measuring the temperature of a surface at a distance, which utilise a laser-generated aiming beam projected from the measuring instrument for the purpose of striking a surface or other target and thereby indicating to the user that the instrument is properly aligned for measurement or treatment.

[0002] It is known in the art of laser-aimed measuring instruments to project a single, i.e. central, laser beam from the instrument to create a spot of laser light on the target at a desired point of the area of the target under investigation or treatment.

[0003] It is also known in the art of laser-aimed measuring and treatment instruments to utilise a beam splitting means which causes a single laser beam, generated within the measuring or treatment instrument, to be split into a plurality of beams which are, for example, equally spaced about a central axis and at the same radius from the axis, so that a plurality of light spots are formed on the target and can serve to outline an area of the target which is under investigation. When a single central laser beam is utilised for the production, by splitting, of a plurality of spaced beams to form a pattern on a target, there is a difficulty of the intensity of the beams after splitting becoming very much reduced in intensity with respect to the intensity of a single laser beam before it is subsequently split, e.g. as by a conventional beam splitter device or a diffraction splitter such as a grating. Thus, a single central beam may well be sufficient in intensity to illuminate only a central spot on a target at a selected distance, but if that same single laser beam is split into, for example, twelve fractional beams intended for producing a pattern of spots of light on the target, the intensity of each of those fractional beams will be only about one twelfth of that of the single central beam. Thus, at a comparable distance from the measuring instrument, the fractional beams may be difficult or impossible to be seen by the user of the instrument. An advantage of a single beam of high intensity is that it is easily seen and directed, but may be too bright to be safe for the eye. Multiple beams are safer and less bright and form a useful pattern of spots, but may be too dim.

OBJECTS OF THE INVENTION

[0004] It is accordingly a primary object of the invention to provide an improved laser aiming, guiding or sighting means, for use in conjunction with a measuring or treatment instrument. This permits changing the production of beams of the laser device from a smaller

number of beams to a larger number of beams, and vice versa. The smaller number of beams are each of relatively greater intensity than the larger number of beams and permit the user of the instrument to see where the beams are striking the target more clearly because of their relatively greater intensity. He may then subsequently utilise the larger number of beams to locate or outline a desired area of the target more precisely. The general location of that area of the target is known to the user, even if the illumination of the larger number of beams is considerably fainter, because the user will first have had the advantage of seeing the target area pinpointed by the smaller number of beams.

[0005] Another object of the invention is to provide a laser beam generating means, for use in conjunction with a measuring or treatment instrument, which permits changing the beam production from a first state in which there is a single central beam, of relatively greater intensity, to a second state in which there is a plurality of fractional beams, of relatively lesser intensity, for example to outline an area of a target, and, for example, also to include an additional central beam within the outline.

[0006] Yet another object of the invention is to provide beam changing means which are readily operable by the user of the instrument for selecting at will the number or pattern of beams being projected.

[0007] Yet another object of the invention is to provide in a hand-held device an arrangement including beam splitter means which are readily movable at the will of the user for placing into and out of the line of a single laser beam.

[0008] Yet another object is to provide means for the timed duration of the projection of each selection of beams.

[0009] Yet another object is to provide means for automatic alternation of two or more kinds of aiming beam projection, such that the user has the target area continuously and repetitively illuminated respectively by the brighter single central beam and the plurality of fractional beams defining an area of the target.

[0010] A still further object is to provide an instrument in which a switching means, serving to change the beam projection from a lesser number of beams to a greater number of beams or vice versa, serves to cause a projection of a number of beams which produce a desired pattern, which may be varied at the will of the user, or from time to time automatically, or both, on a target area.

[0011] Yet another object of the invention is to provide a device which permits aiming, guiding, and sighting of a beam or beams for purposes other than temperature sensing purposes, such as for treatments or decorative and/or entertainment purposes, or activation of apparatus as a signalling means.

[0012] Yet another object of the invention is to provide the combination of a measuring or treatment instrument and laser beam projecting means having the characteristics set forth in the foregoing objects.

SUMMARY OF THE INVENTION

[0013] According to a first aspect of the invention there is provided a laser light beam generating means, for use in conjunction with directing a measuring or treatment instrument, which permits changing the production of the projected laser beam from a lesser number, for example a single central beam, to a larger number of beams utilised to define an area of a target centered on the point defined by the single central beam.

[0014] According to a second aspect of the invention there is provided a measuring instrument, for example an instrument (pyrometer) for measuring the temperature of a target situated at a distance from the measuring instrument, which includes a laser generating and directing means as set forth in the preceding paragraph.

[0015] According to a still further improvement, the means provided for the front end of the laser beam generating instrument, for example a pyrometer, for varying the nature of the beam emitted, are manufactured as an attachment in the form of a separate entity which can be mounted removably on the instrument, so as for example to be attachable and detachable (for example as a self-tapping thread) as and when desired, and so that attachments with different beam-varying properties may be selected and utilised as required. The attachments may conveniently have relatively movable portions, for example in the form of a slideway, for mounting on the instrument, and a slide movable in the slideway into respective positions in which different forms or degrees of modification of the laser beam are obtained. By way of example, such a movable portion may have positions in which it presents respectively a simple opening or a beam splitter in the path of the laser beam, or again in which it presents a beam attenuator and a beam splitter in the path of the beam. In a further feature, the movable portion of the attachment may serve to actuate switching means, on the instrument, arranged to vary the strength of the laser beam appropriately. In a further embodiment, the attachment provides selective production of, for example, a single central beam of relatively higher power, for aiming at a target to permit accurate sighting on a selected area of the target, combined with a plurality of other or split beams directed at the target for outlining an area thereof, or for producing a pattern of spots on the target. In a further form, the plurality of beams may be shifted from time to time, say in a circle, so as more clearly to outline a selected area of the target. In yet another form, the attachment provides projection of split beams which strike the target as a closed loop figure, such as a circle. In yet another arrangement, the attachment is arranged to divert a single laser beam to strike successive plural points on a target so as effectively to outline an area thereof, and preferably with a rapidity sufficient to result in persistence of vision giving the impression of a full illumination of the line of suc-

cessive points.

BRIEF DESCRIPTION OF THE DRAWINGS

[0016] In the drawings:

Figure 1 is a perspective elevation of a measuring instrument, for example a pyrometer, utilised for measuring, at a distance, the temperature of a selected area of a target;

Figure 1A is a perspective elevation of a measuring instrument, corresponding to that shown in Figure 1, seen with part omitted and part in section to reveal internal details;

Figure 2 is a diagram to show a single central light spot which is produced in one aiming phase of operation of a beam-changing device on the measuring instrument, and also a circle of twelve circumferentially spaced light spots, of lesser intensity, produced during another aiming phase of operation of the beam-changing device;

Figure 3 is a schematic elevation of a laser light projector which can be made to project either or both together a single beam, for location of a target, and/or a plurality of beams for creating a light distribution pattern or design on the target;

Figures 4 and 4A are respectively a side elevation of a laser light projector, and a front elevation of a target therefor, in which the projector can be made to project both a single beam for location of a "center" on a target, and a plurality of beams for operation of a locking system;

Figures 5 and 5A are respectively a side elevation of a laser light projector, and a front elevation of a target therefor, in which the projector can be made to project a centering beam and/or a plurality of beams for providing a pattern on the target, say a theatrical stage;

Figure 6 is a schematic elevation of a laser light projector which is used in surgical, dental, and medical fields for accurate aiming for cutting, healing, and other curative purposes;

Figure 7 is a schematic elevation of a laser light projector having two, or more, projectors which can be aimed to cause the beams to coincide on a target to provide ranging of the target;

Figures 8A, 8B, 8C and 8D are box diagrams to illustrate methods of carrying out the invention.

DETAILED DESCRIPTION OF THE DRAWINGS

[0017] In Figures 1 and 1A of the drawings there is shown a preferred embodiment and best mode of practicing this invention in which a temperature measuring instrument (pyrometer), designated generally by reference numeral 101, is intended for pointing at a target so as to determine, without contact, at a distance, the temperature of a selected target area. The hand held instru-

ment has a handle 102, selector switches 103 for changing ranges of readings, and a digital read-out screen 104 to indicate temperature. This is suitable for single hand operation. At the front end 105 of the instrument there is provided a heat-sensitive device 106 which includes means for detecting radiation from the target area on a heat-sensitive element (not shown) within the instrument. Also on the front end 105 there is provided an outlet 137 for a laser beam 112, produced by a laser beam projector 136 located within or upon the instrument. Over the outlet 137 there is positioned a slide 107 which has stops 108 and 109 which limit its movement in an up and down direction. In the slide 107 there is a first aperture 110 which, when aligned with the beam producer 136, permits a single central beam 112, of relatively high intensity, to be projected towards the target 111 to strike it at 112A.

[0018] In the slide 107 there is a second aperture 113 which incorporates a beam splitter serving to split the single beam into twelve radial fractional beams 114 spaced evenly and circumferentially where they strike the target 111 at 114A. The slide 107 is arranged to be easily movable into register with the outlet 137 by the user of the measuring instrument, say by one finger of a single hand holding the instrument.

[0019] In another embodiment, not illustrated, the slide 107 is replaced by a beam splitter which can be hinged or rotated into position over the laser beam outlet 137, or can be arranged to slide into and out of position, or is held in position by fastening means providing a clip-on or screw-on action.

[0020] In a further embodiment, movement of the slide or other carrier for the beam splitter is obtained mechanically or electrically, as distinct from the manual form shown. A range of different beam splitters may be selected from storage, as with bits for a drill, and may produce different patterns or brightness and may be clipped into position. These may produce a central beam 112 together with several fractional beams 114. The beam splitter, in a further embodiment, has provision for providing a plurality of fractional beams 114, whilst at the same time providing also a single central beam 112, to be used for aiming purposes, which single central beam 112 if required may be lessened in intensity to avoid danger to people.

[0021] In a still further embodiment, changing of the beam-splitter means from single beam to multiple beams is obtained automatically on a timed basis, either as a one-off operation, or as a repetitive operation, so that in the latter case the user of the instrument will have an automatic change-over from a single central beam, for correct aiming, to multiple beams for defining the target area. In a yet further embodiment the timed basis is made variable at the choice of the user of the instrument.

[0022] In a further embodiment, the relative lengths of the timings of the single-beam operation and of the multiple-beam operation are different, e.g. short single

beam-operation for aiming, followed by a relatively longer multiple-beam operation.

[0023] In yet another embodiment, provision is made for spring-loading the beam-changing means into a rest position, i.e. normally to provide multiple-beam operation, but movable when desired so as temporarily to show the single aiming beam operation.

[0024] In yet another embodiment, the variation of the projection of the laser beam is to provide patterns other than a plurality of dots, for example a circle of laser illumination or a rectangle.

[0025] In yet another embodiment, the beam varying means provides a projection of information onto the target area, e.g. technical information, or advertising information.

[0026] The invention is particularly useful for varying the brightness in circumstances where the ambient light on the target would make it difficult, or impossible, to see a pattern of individual laser light spots hitting the target area.

[0027] In yet another embodiment the device which serves to change the nature of the laser beam has more than two settings, and is for example of a rotary nature, and in a preferred embodiment is in the form of a knurled disc or turret for ease of operation with the finger.

[0028] In further embodiments, substitutable heads are provided, each having different combinations of single and multiple spot configuration, and different beam brightness. In another embodiment the switch or other control which serves to change the nature of the laser beam projection is a so-called "flip" switch, and in yet another embodiment the means for changing the laser beam projection is a series of optical devices disposed on a rotatable turret. Detachable devices may be used.

[0029] In other embodiments, the pattern of laser light serving to define an area of the target is a continuous group of two or more such radially spaced concentric patterns, continuous or interrupted, defining for example an inner area and one or more outer areas of the target.

[0030] In a still further embodiment the means for determining the nature of the laser light aimed at the target is carried by a removable member, e.g. a snap-on or screw-on fitting for mounting on the body of the measuring instrument.

[0031] A primary use of the device of this invention is with a battery-powered hand-held measuring instrument intended for use in one hand.

[0032] In all instances referred herein involving the production of a plurality of fractional beams, there may also be provided at the same time a single central beam to assist in aiming of the instrument.

[0033] Referring to Figure 3 of the drawings a laser beam projector 115, for example of the kind described with reference to Figure 1, and here shown only schematically at 115, is arranged to project, at the will of the user, either a single central beam 116 which can be

used to aim the projector in correct alignment with a central target 117, or then changed by switching to provide a plurality of beams which are designated collectively as 118, which produce a pattern 119 on the target, e.g. the simple tree shape shown.

[0034] Referring to Figures 4 and 4A of the drawings a laser beam projector 115, for example similar to the hand-held device shown in Figure 1 is arranged to project selectively both a single central beam 120 for aiming and centering purposes with a plurality of spaced beams 121 arranged in a circle, or any other desired pattern. The projector is intended for use in operating a switching or locking and unlocking system, say for example a television set or a garage door. On the door, or adjacent to it, there is provided a receptor 122 having a plurality of light-sensitive switches 123 arranged in a circle or other pattern corresponding to the pattern of the projector. The user of the projector, say a driver in a car, aims the projector, using the single brighter central beam, at a center 124 of the receptor 122 and then switches the projector to multiple-beam operation, so that each of the switches receives an individual beam, causing the garage door to be unlocked. Different lesser numbers of the multiple beams are used, and changed from time to time, so that the user has a "combination" lock which can be varied for greater security.

[0035] Referring to Figures 5 and 5A of the drawings, a projector 125, capable of producing both a single central beam for aiming purposes, and also a plurality of beams, serves to permit accurate aiming of laser light in a single beam to position the projector relative to a theatrical stage 126 by aiming at a central point on a part of the stage, and then at the will of the operator can project a pattern 127 say of a human figure or of a "ghost", at the desired point of the stage.

[0036] Referring to Figure 6 of the drawings, a projector 128 is capable of producing a single stronger laser light beam for centering and/or treatment purposes, and also a plurality of individual identification beams which are distinct or merge to strike a defined area. The single beam 129 is aimed for example at a center point of an area to be treated, say a human eye 130 or a tooth or skin lesion, after the projector has been switched to produce a plurality of beams 131 to serve for identification of the area which they cover.

[0037] In each of the examples described with reference to Figures 3 to 6, it will be seen that the single central beam, or a plurality of relatively stronger beams, are used for general aiming or treatment purposes, and that the plurality of relatively weaker beams are used to provide a desired identification result on a target.

[0038] Referring to Figure 7, a laser light projector 132 is shown as a single item but alternatively is provided in the form of two or more separate instruments suitably positioned and aligned. The projector 132 projects two or more beams 133 in a convergent pattern of which the angle can be varied.

[0039] Thus, with the beams 133 convergent at a first selected angle, there is a relatively brighter illumination of an aiming point 134 on a target 135, whereas with a different angle of projection of the beams 133 there will be a greater illumination of the target centered on the aiming point 134. As the change of angle will be known, the device can likewise be used as a form of range finder. The target 135 could be, for example, a marker let into a road surface or set beside a road, or a buoy for marine purposes, or a marker on an airfield. In each case there is the advantage that laser light has a very much greater penetrative power than ordinary incandescent or strobe light, so that improved use in mist, fog, smoke and other obscuring circumstances is possible.

[0040] Splitting of a single laser beam, used for example for centering and aiming purposes, into a plurality of subordinate beams, used for any of the purposes described above, may conveniently be obtained by means of a diffraction grating form of beam splitter, but other forms of beam splitter, such as multiple mirrors, may be used.

[0041] In a preferred embodiment the changeover from a single central aiming beam to a plurality of subordinate beams is obtained at a time and rate automatically by a selected timed sequencing arrangement in the projector, with the timing and sequencing made adjustable as required, for example, by insertion of pre-programmed units into a receptor of the projector.

[0042] In a further embodiment provision is made to compensate for the relative weakening of the subordinate beams by arranging that the intensity of the "main" single beam is stepped up appropriately at the time of changing from single to multiple beam operation, and preferably but not necessarily by the factor of the number of the subordinate beams obtained.

[0043] Where a pattern of, say, twelve or sixteen "spots" is obtained by the use of a beam splitter, there will be a corresponding lessening or attenuation of the intensity of the subordinate beams by approximately that same numerical factor. In order to permit the use of relatively smaller, and cheaper, lasers, the subdivision of the single aiming beam, in a still further embodiment, is reduced to a much smaller figure, say only six subordinate beams, with at the same time a change of aiming of the subordinate beams on a regular timed or pulsed basis. For example, where twelve "spots" are required on a target, the laser projector provides only six subordinate beams but projects the group of beams alternately in a first position and then in a second position, or in rotated sequential positions angularly changed from the first position, so that the user has the illusion of twelve "spots" being maintained.

[0044] In all of the embodiments described above wherein there is a changeover from a single (or multiple) aiming beam to a plurality of subordinate beams which define or outline an area or a pattern, the laser projecting means are arranged, in a further embodiment, to

carry out mechanically or electronically the changeover at a relatively very rapid rate, say twelve or more times per second, so that the strength of the beam can be at its full power, without diminution according to the number of circumferential "spots" or the pattern to be produced, and persistence of vision will enable the user to see the "spots" or pattern at apparently full laser strength.

[0045] Referring now to Figures 8A,8B,8C and 8D there are shown a number of methods of carrying out the invention.

[0046] In Figure 8A a single primary beam (or a relatively small number of primary beams) is or are generated, and the or each primary beam is then split into a number of secondary beams which are then projected to strike the target at predetermined fixed points (i.e. small areas) of the target.

[0047] In Figure 8B a single primary beam (or more than one) is or are generated and the or each primary beam is then split into a number of secondary beams which are then projected so as to strike the target at successive points of the target.

[0048] In Figure 8C a single primary beam (or more than one) is or are generated and the or each primary beam is formed into a closed loop secondary beam, such as a circle, and the or each secondary beam is projected so as to strike the target.

[0049] Where more than one such closed loop secondary beam is formed, e.g. circles, there may be one within another, e.g. concentric.

[0050] In Figure 8D a single primary beam (or more than one) is or are generated, and the or each primary beam is deflected successively to each of a number of small areas of the target, and particularly at a high rate sufficient to give rise to persistence of vision.

[0051] In each of the above described methods, the primary beam, or beams, generated in the first box of the respective Figure 8A,8B,8C or 8D is firstly directed at the target for aiming purposes, whereas the secondary beams generated in Figures 8A,8B and 8C, and the primary beam(s) of Figure 8D, strike the target so as to outline an area of the target.

[0052] In each of the methods described with reference to Figures 8A,8B,8C and 8D the pattern or number of small areas, or plural closed loop figures, defined on the target may be made subject to variation in number and/or shape, at the will of the user, so as to result in a form of "coding", for example when the target has areas sensitive to laser light and certain ones of which need to be exclusively activated for operation of a mechanism such as a lock or machinery activator. An aiming beam or beam array is useful in directing medical/surgical/dental equipment for precise treatment or manipulation of remote body areas. These include lasers, X-rays, ultrasound, diathermy, cutting/drilling tools, cautery, and injection tools.

[0053] Precision material treatment tools, e.g. for drilling, cutting, burning, welding, and soldering, may

also be directed by visible laser light location, either manually or automatically.

Claims

1. A laser beam sighting means, for use in conjunction with instruments, comprising the combination of: (a) means for generating at least one primary laser beam, of relatively greater intensity, for directing towards a location area of a target surface; (b) beam splitter means for subdivision of said at least one laser beam into more than two subdivision secondary beams, of relatively lesser intensity, for directing towards respective bounding areas of said target surface spaced laterally from said location area, for indicating on said target surface a required zone, and (c) means for changing selectively between primary and secondary beam display.
2. A laser beam sighting means, as claimed in claim 1, wherein said means for subdivision comprise means for varying the number of secondary beams produced.
3. A laser beam sighting means, as claimed in claim 1, wherein said subdivision means are arranged to operate at successive periods separated by time intervals such that the zone of the target area is illuminated alternately by the at least one primary beam, and by the secondary beams.
4. A laser beam sighting means, as claimed in claim 1, wherein said subdivision means are arranged to direct said secondary beams to define at least one pattern on the target surface.
5. A laser beam sighting means, as claimed in claim 4, wherein said subdivision means are arranged to direct said secondary beams sequentially to define each of a plurality of patterns on the target surface.
6. A laser beam sighting means, as claimed in claim 1, in combination with means for determining, at a distance, the temperature of said location area of said target surface.
7. A laser beam sighting means, as claimed in claim 1, wherein said means for subdivision of the primary laser beam is a beam splitter.
8. A laser beam sighting means, as claimed in claim 7, wherein said beam splitter means is movable, with respect to said beam generating means, into and out of a position in which it is placed in the path of said at least one primary beam.
9. A laser beam sighting means, as claimed in claim 8, wherein said beam splitter means is hingedly mov-

able into and out of said position.

10. A laser beam sighting means, as claimed in claim 8, wherein said beam splitter means is slidably movable into and out of said position.

11. A laser beam sighting means, as claimed in claim 8, wherein said beam splitter means is rotatably movable into and out of said position.

12. A laser beam sighting means, as claimed in claim 8, comprising means for periodically moving said beam splitter means into and out of said position

13. A laser beam sighting means, as claimed in claim 12, wherein said means for periodically moving said beam splitter means is arranged to place said beam splitter means into position for a relatively shorter time period, and to place said beam splitter means out of position for a relatively longer time period.

14. A laser beam sighting means, as claimed in claim 13, comprising means for varying the respective shorter and longer periods.

15. In a method of operating a laser beam sighting means which comprises steps of: (a) generating at least one primary laser beam, (b) directing said at least one primary beam towards a first small location area of a target surface, and (c) splitting said at least one primary beam into a greater number of secondary beams of lesser intensity, the improvement comprising thereafter (d) directing said secondary beams also towards second larger respective bounding areas of said target surface spaced from said first small location area as well as said location area; and (e) selectively changing between primary and secondary beam display.

16. A method of operating a laser beam sighting means which comprises steps of: (a) generating at least one primary laser beam, (b) directing said at least one primary beam towards a location area of a target surface, (c) splitting said at least one primary beam into a greater number of secondary beams of lesser intensity, (d) directing said secondary beams successively towards bounding areas of said target surface spaced from said location area; and (e) selectively changing between primary and secondary beam display.

17. A method of operating a laser beam sighting means which comprises steps of (a) generating at least one primary laser beam, (b) firstly directing said at least one primary beam towards a location area of a target surface, (c) thereafter splitting said at least one primary into a greater number of secondary beams of lesser intensity to define a closed loop

bounding area on said target surface, and (d) selectively changing between primary and secondary beam display.

18. A method of operating a laser beam sighting means which comprises steps of: (a) generating at least one primary laser beam, (b) directing said at least one primary laser beam towards a location area of a target surface, (c) deflecting said at least one primary beam successively to each of a plurality of zones defining a closed loop bounding area on said target.

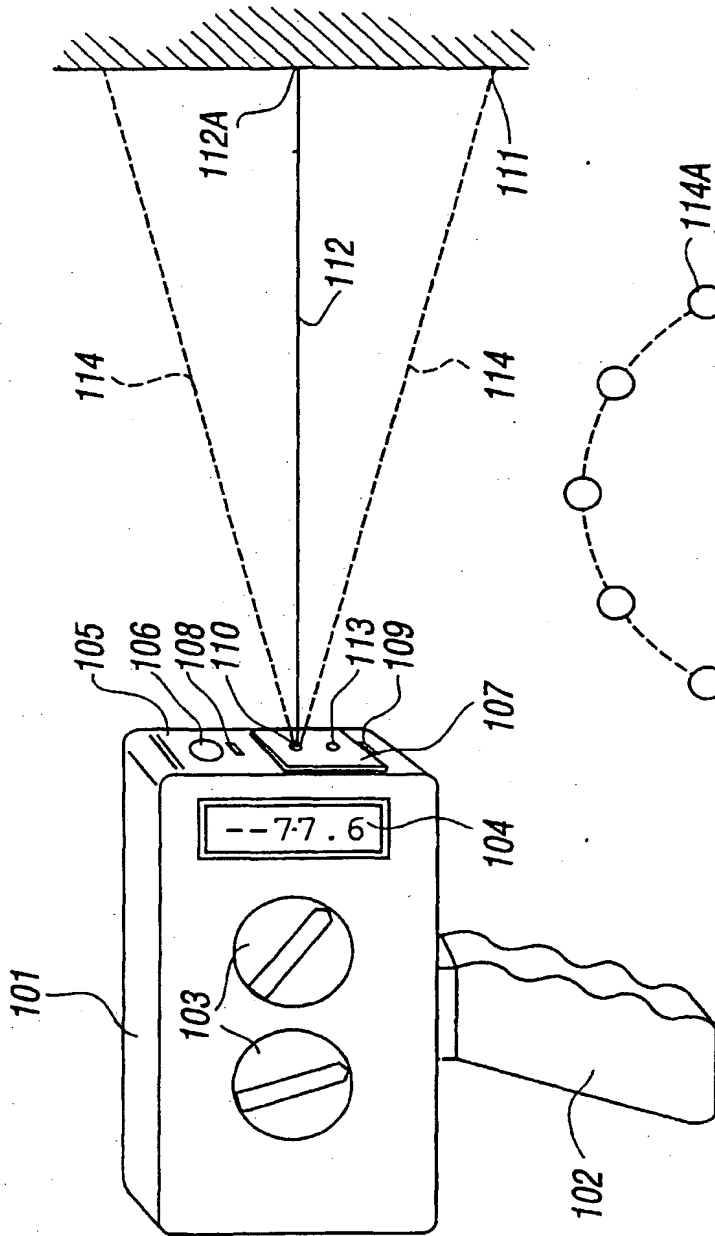


FIG. 1

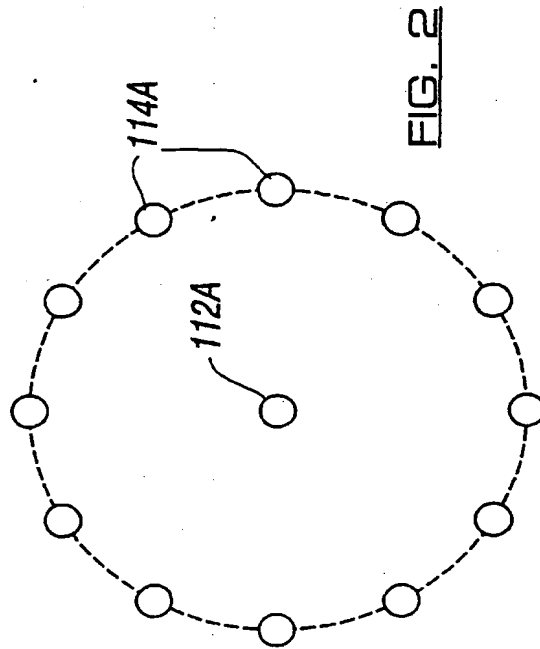
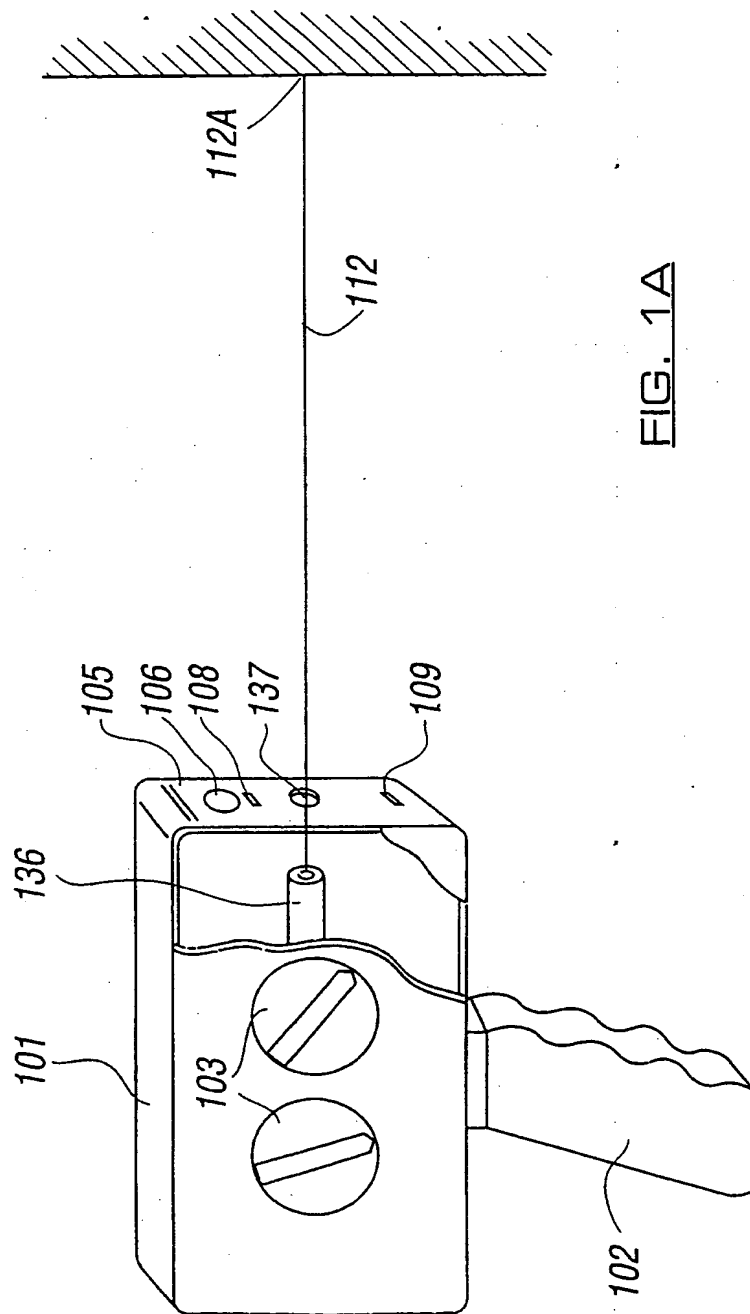


FIG. 2



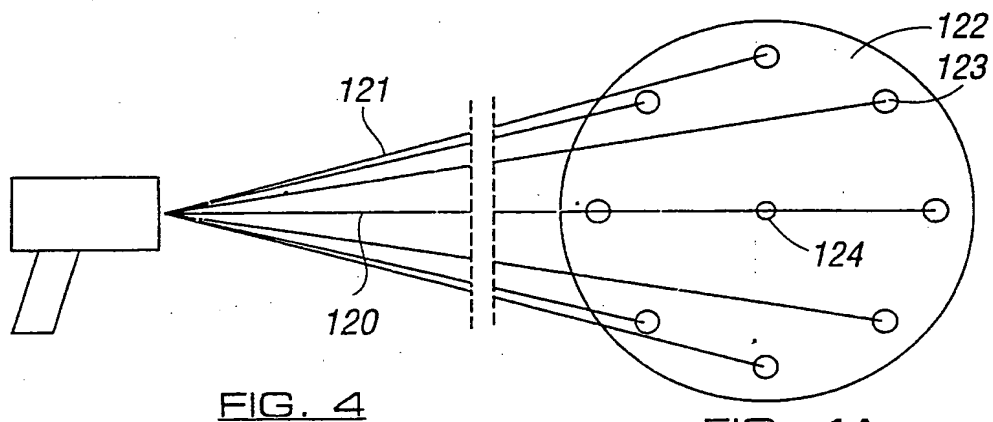
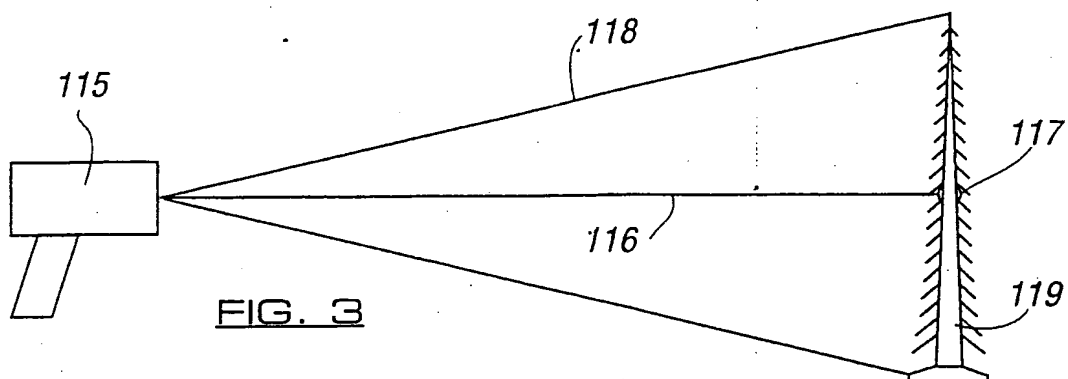


FIG. 4A

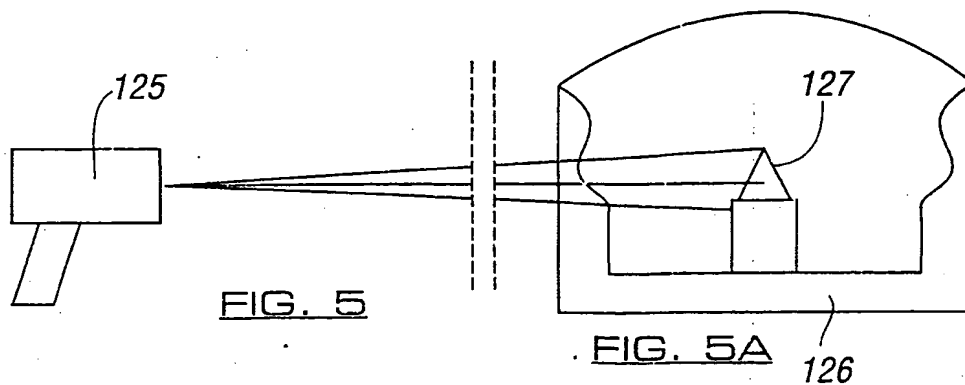


FIG. 5A

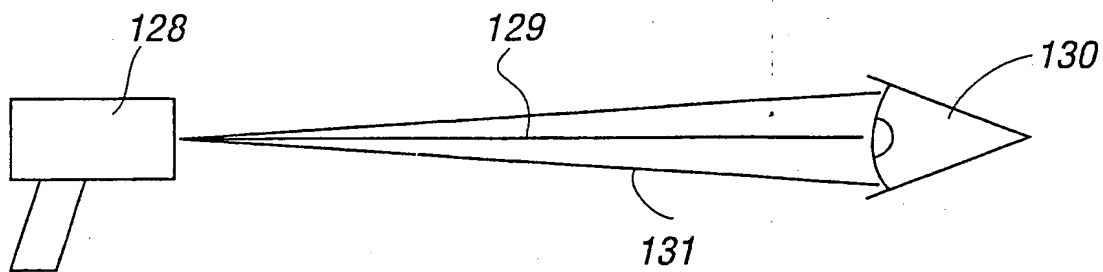


FIG. 6

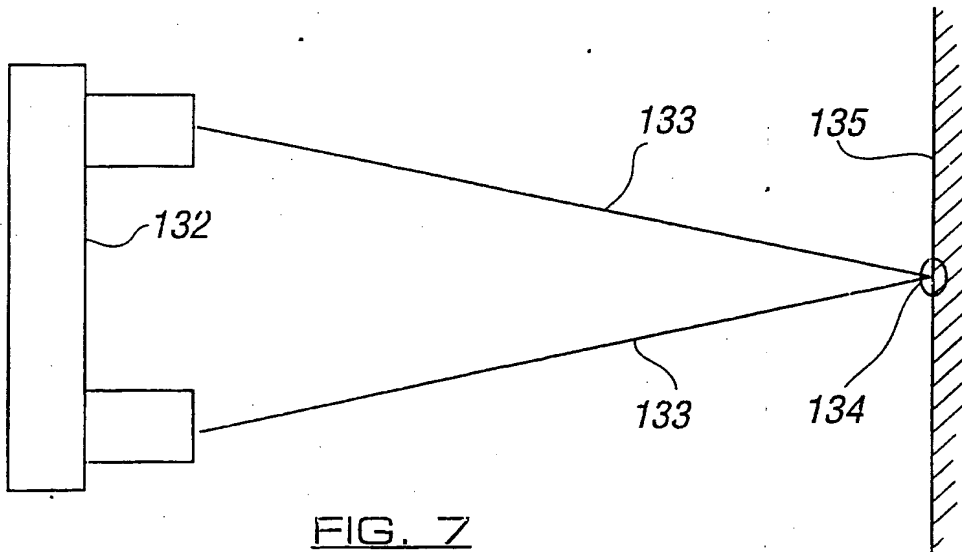


FIG. 7

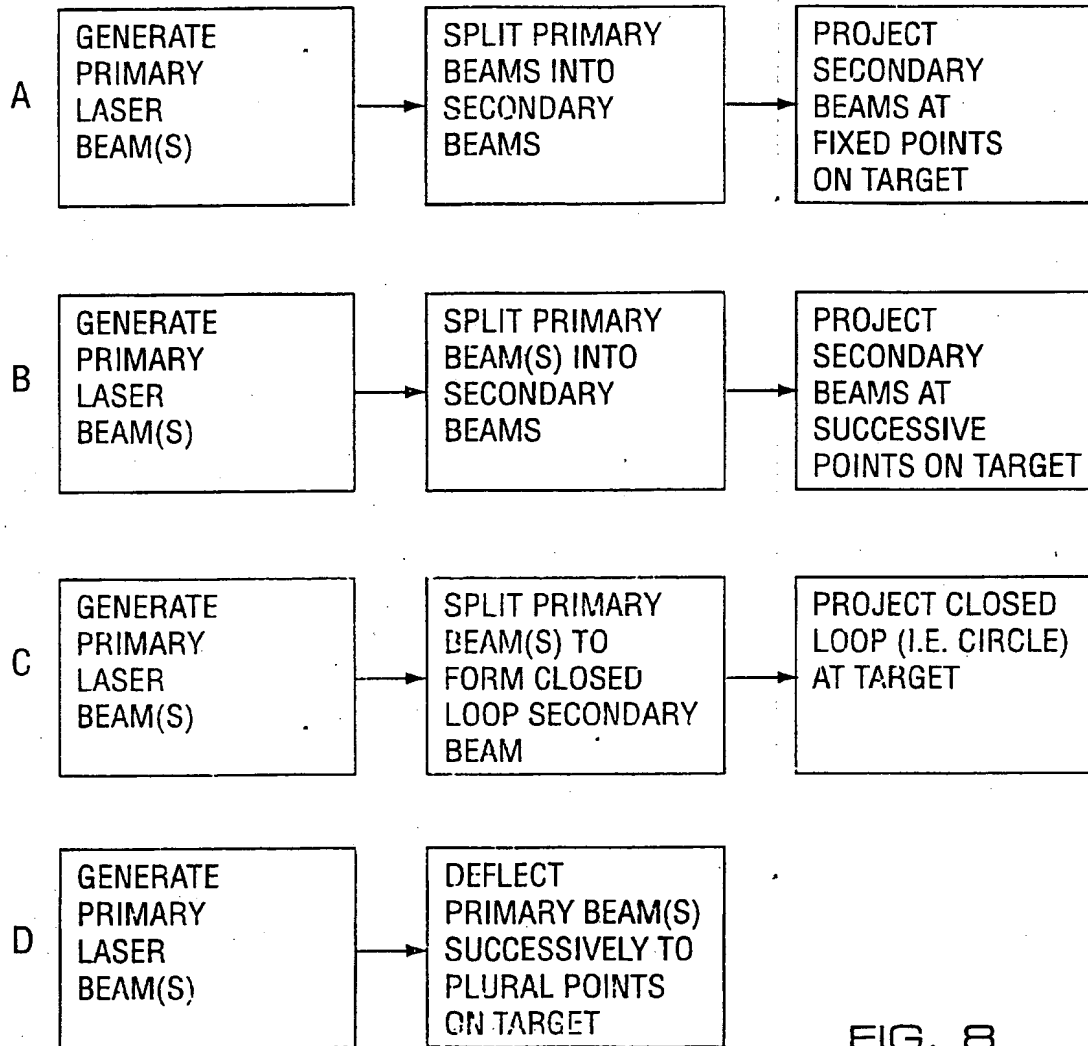


FIG. 8

(19)



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(54) Measuring or treatment instrument with laser sighting

(57) A laser sighting device, for use in conjunction with measuring and treatment instruments, such as pyrometers, has means for generating at least one primary laser beam (112), of relatively greater intensity, to be directed at a target surface (111) so as to illuminate a small area thereof, for example a central spot (112A) of the area. The device has means (107, 113) for, from time to time, sub-dividing the at least one laser beam into a greater number of secondary beams (114) of lesser intensity directed towards the target area for the purpose of creating on the target surface at least a number of spots (114A) some of which are spaced outwardly of the central area, to define a zone for investigation with the instrument. The secondary beams (114) are of lesser intensity than the primary beam (112) and vary in number, and the arrangement is such that the means (107, 113) for sub-dividing the primary beam operate at timed intervals so that the target area is illuminated alternately at the central spot, and thereafter by the secondary beam spots (114A), for defining the zone under investigation. The secondary beam spots serve to define one or more patterns, such as a closed loop (Fig. 2), on the target area. The secondary beams may include a central spot beam (112). As the result of sub-dividing of the primary beam is to lessen the intensity of the spots formed by the secondary beams, the primary beam serves to give the user of the instrument a clear

visual indication of a point of the target area, for aiming purposes, whereafter the spots of the secondary beams serve to indicate to the user the specific area of the target which is under investigation.

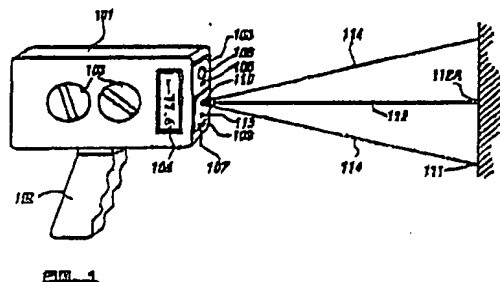


FIG. 1

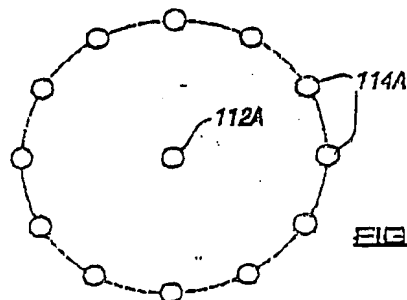


FIG. 2



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EUROPEAN SEARCH REPORT

Application Number
EP 00 30 5526

DOCUMENTS CONSIDERED TO BE RELEVANT			
Category	Citation of document with indication, where appropriate, of relevant passages	Relevant to claim	CLASSIFICATION OF THE APPLICATION (Int.Cl.7)
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A	EP 0 458 200 A (HORIBA LTD) 27 November 1991 (1991-11-27) * abstract *	1	
A	DE 37 10 486 C (TESTOTEM MESSTECHNIK) 4 August 1988 (1988-08-04) * abstract *	1	
A	US 4 315 150 A (DARRINGER RICHARD E ET AL) 9 February 1982 (1982-02-09) * abstract *	1	
The present search report has been drawn up for all claims			TECHNICAL FIELDS SEARCHED (Int.Cl.7) G01J F41G A61B A61F
Place of search THE HAGUE		Date of completion of the search 8 January 2001	Examiner De Buyzer, H
CATEGORY OF CITED DOCUMENTS X : particularly relevant if taken alone Y : particularly relevant if combined with another document of the same category A : technological background O : non-written disclosure P : intermediate document T : theory or principle underlying the invention E : earlier patent document, but published on, or after the filing date D : document cited in the application L : document cited for other reasons Δ : member of the same patent family, corresponding document			

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